PSYCHOLOGY 480: GENES AND COGNITION
WEDNESDAY 2:00 – 4:30
SEWALL HALL 462

INSTRUCTOR CONTACT INFORMATION

1. Instructor: James L. Dannemiller
2. Office: Sewall Hall 470A
3. Email: dannemil@rice.edu
4. Office Hours: T 1:00 – 2:00 and by appointment

COURSE OBJECTIVES AND LEARNING OUTCOMES

1. The student will understand behavior genetic and molecular genetic methods in modern genetic association studies.
2. The student will be familiar with the common terminology encountered in modern genetic association studies.
3. The student will be able to access, read and understand genetic studies relevant to a topic of interest in Psychology.

REQUIRED TEXTS AND MATERIALS

There is no required text for the course. Instead, we will reply on several excellent online resources, as well as lecture and discussion to understand modern genetic association studies.

We will be reading original research articles each week. These can be challenging because of unfamiliar jargon. In my experience, although challenging, this can be an excellent way to learn both the methods and content of the course.

I will provide you with an extensive glossary of terms and concepts in behavioral and molecular genetics. You should have this with you whenever you read an assigned article in the class. It will help you to work your way through what at first might be some very unfamiliar terminology and jargon. You should bring this glossary file to class each week because we will make extensive use of it in discussing the articles.

Please bring a laptop, tablet, or something other than a smartphone to access the internet to class each week. You will need this to look up terminology in the course.

ASSIGNMENTS AND PAPERS

1. Twice during the semester you will lead a class discussion on an assigned article. In addition to leading the discussion on the article, you will submit two questions on the article that will be given to all of the students in the class after the article is discussed. Those two questions should be substantive ones (not something like "How many subjects were there in this study?") and submitted BEFORE class to psyc480@gmail.com Notice, this is a gmail address, not a Rice email address. Along with the questions, you should submit the answer to each question. You will automatically be given full credit on these questions (see the next point) that you submit.

2. Students will answer those questions after the class discussion of those articles some time between the end of that class and the beginning of the next class period. Students will submit their answers to those questions by uploading a file to Owlspace dropbox. The filename will consist of your last name and the date that the article was discussed. For example, if your name is Maria Greenwald, and you are answering questions on an article that was discussed on September 30, then the filename would be greenwald september 30.docx or greenwald_september_30.docx. You may discuss your questions with other members of the class, but everyone must submit their own answers after discussing the questions. Copying a set of answers is strictly prohibited and will result in a 0 for that assignment.

3. Each student will submit a 10 – 12 page paper at the end of the term summarizing literature relevant to a topic of interest to them. For example, you might be interested in genetic contributions to some disorder such as Fragile X syndrome or ADHD. You would then find genetic association or behavior genetic studies relevant to that topic and summarize their results in your paper. Before the end of the semester, you will submit a brief (no more than one page) paper proposal with your proposed topic and at least two relevant references. I will approve the proposed topic or suggest that you modify it in a particular way.

GRADE POLICIES

40%: Your grades from your answers to the article questions each week will be added (averaged), and this will contribute a total of 40% to your course grade. I will throw out your lowest grade before computing your overall article-answers grade. If there were a total of 30 articles on which you answered questions throughout the semester, then after throwing out your lowest grade, the answers to each article would count 1.38% (40%/29) toward your course grade.

30%: Your grade from the final paper will contribute 30% toward your course grade.

20%: Twice during the semester you will lead a discussion on one of the assigned articles. Each of these will be worth 10% of your course grade. Together they will contribute 20% to your final grade.

10% The remaining 10% of your course grade will come from your participation in class discussion. Asking questions is a good way to participate in class. Offering answers is also another good way to participate.

ABSENCE POLICIES

You are expected to attend every class unless there is an emergency, death in the immediate family (grandparents, parents,

siblings), or a religious obligation. Please email me BEFORE CLASS if you are going to be absent from class, and include the reason for your absence.

If you are absent for an excused reason, then I will allow you to make up the answers to the article questions that you missed within a week of when they were due. If for some reason you cannot complete the answers to the article questions from a given week, I will record a 0 for your grade on each of the two articles for that week.

RICE HONOR CODE

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

DISABILITY SUPPORT SERVICES

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

SYLLABUS CHANGE POLICY

This syllabus is only a guide for the course and is subject to change with advanced notice.

PLEASE NOTE:

ON THE FOLLOWING DATES, CLASS WILL BE DISMISSED AT 3:55 INSTEAD OF 4:30: SEPTEMBER 14 & NOVEMBER 16

CLASS IN CANCELED ON OCTOBER 12 FOR RELIGIOUS OBSERVANCE REASONS AND ON OCTOBER 19 BECAUSE I WILL BE AT THE ANNUAL CONFERENCE OF THE AMERICAN SOCIETY FOR HUMAN GENETICS.

COURSE SCHEDULE (READINGS FOR EACH WEEK ARE LISTED BELOW)

Week 1	**Introduction**
8/24	**Genetics and family relationships**
	"The Ghost of Bobby Dunbar" - audio
Week 2	**Personal genetics and in-class problem solving on maternity and paternity**
8/31	
Week 3	**Where we came from**
9/7	
Week 4	**Genetic consequences of consanguinity, endogamy, and genetic isolation**
9/14	**Class dismissed at 3:55**

Week 5	**Race, ethnicity and genetics**
9/21	
Week 6	**Heritability and the Genetics of Intelligence**
9/28	
Week 7	**Genetics, cognition and development**
10/5	
Week 8	**No class meeting**
10/12	
Week 9	**No class meeting**
10/19	
Week 10	**Genetics of childhood neurological and behavioral disorders**
10/26	
Week 11	**Genetics of taste and smell**

11/2	
Week 12	**Genetics of speech and language disorders**
11/9	
Week 13	**Epigenetics I: mechanisms and examples**
11/16	**Class dismissed at 3:55**
Week 14	**Epigenetics II: transgenerational inheritance (the ghost of Lamarck)?**
11/23	
Week 15	**Heritability and genetics of sexual orientation and sex differences; Sex selection for prospective births?**
11/30	

THERE ARE 13 CLASS MEETINGS (ONCE THE CANCELLATIONS ARE TAKEN INTO ACCOUNT)

THE COMPLETE REFERENCE FOR EACH OF THE READINGS IS GIVEN BELOW.

1. Genetics and family relationships

"The Ghost of Bobby Dunbar" – This American Life Podcast #352 (2008)

2. Personal genetics and in-class problem-solving

Nyholt, D. R., Yu, C. E., & Visscher, P. M. (2009). On Jim Watson's APOE status: genetic information is hard to hide. *European Journal of Human Genetics, 17(2)*, 147 149. doi: 10.1038/ejhg.2008.198

Shriver, M. D. & Kittles, R. A. (2004). Genetic ancestry and the search for personalized genetic histories. *Nature Reviews Genetics, 5(8)*, 611-8.

23andme Terms of Service (August 2016): https://www.23andme.com/about/tos/

3. Where we came from

Prüfer, K., Racimo, F., Patterson, N., Jay, F., Sankararaman, S., Sawyer, S., ... & Li, H. (2014). The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature, 505(7481)*, 43-49.

Semino, O., Passarino, G., Oefner, P. J., Lin, A. A., …, & Underhill, P. A. (2000). The genetic legacy of Paleolithic Homo sapiens sapiens in extant Europeans: a Y chromosome perspective. *Science, 290(5494)*, 1155-9.

4. Genetic consequences of consanguinity, endogamy, and genetic isolation

Faerman, Marina. (2001). Population Genetics of the Ashkenazim *eLS*: John Wiley & Sons, Ltd.

Hamamy, H., Antonarakis, S. E., Cavalli-Sforza, L. L., …, & Bittles, A. H. (2011). Consanguineous marriages, pearls and perils: Geneva International Consanguinity Workshop Report. *Genetic Medicine, 13(9)*, 841-7.

McDowell, G. A., Mules, E. H., Fabacher, P., Shapira, E., & Blitzer, M. G. (1992). The presence of two different infantile Tay-Sachs

disease mutations in a Cajun population. *American Journal of Human Genetics, 51(5)*, 1071-1077.

5. Race, ethnicity and genetics

Cooper, R. S. (2013). Race in biological and biomedical research. *Cold Spring Harbor perspectives in medicine, 3(11)*, a008573.

Race, Ethnicity, and Genetics Working Group (2005). The use of racial, ethnic, and ancestral categories in human genetics research. *American Journal of Human Genetics, 77(4)*, 519-32.

Behavior Genetics

6. Heritability and the Genetics of Intelligence

Burdick, K. E., Lencz, T., Funke, B., Finn, C. T., Szeszko, P. R., Kane, J. M., . . . & Malhotra, A. K. (2006). Genetic variation in DTNBP1 influences general cognitive ability. *Human Molecular Genetics, 15(10)*, 1563-1568. doi: 10.1093/hmg/ddi481

Davies, G., Tenesa, A., Payton, A., Yang, J., Harris, S. E., Liewald, D., …, & Deary, I. J. (2011). Genome-wide association studies establish that human intelligence is highly heritable and polygenic. *Molecular Psychiatry, 16(10)*, 996-1005. doi: 10.1038/mp.2011.85

7. Genetics, cognition and development

Padmanabhan, A., & Luna, B. (2014). Developmental imaging genetics: linking dopamine function to adolescent behavior. *Brain and cognition, 89*, 27-38.

Knowles, E. E. M., Carless, M. A., de Almeida, M. A. A., Curran, J. E., …, & Glahn, D. C. (2014). Genome-wide significant localization for working and spatial memory: Identifying genes for psychosis

using models of cognition. *American Journal of Medical Genetics, B: Neuropsychiatric Genetics, 165B(1)*, 84-95.

8. No class

9. No class

10. Genetics of childhood neurological disorders

Morrow, Eric M., Yoo, Seung-Yun, Flavell, Steven W., Kim, Tae-Kyung, Lin, Yingxi, Hill, Robert Sean, . . . Walsh, Christopher A. (2008). Identifying Autism Loci and Genes by Tracing Recent Shared Ancestry. *Science, 321(5886)*, 218-223. doi: 10.1126/science.1157657

Clayton-Smith, J.; Laan, L. (2003). Angelman syndrome: a review of the clinical and genetic aspects. *Journal of Medical Genetics, 40*, 87–95.

11. Genetics of taste and smell

Törnwall, O., Silventoinen, K., Hiekkalinna, T., Perola, M., Tuorila, H., & Kaprio, J. (2014). Identifying flavor preference subgroups. Genetic basis and related eating behavior traits. *Appetite, 75*, 1-10.

Mainland, J. D., Keller, A., Li, Y. R., Zhou, T., Trimmer, C., Snyder, L. L., Moberly, A. H., Adipietro, K. A., Liu, W. L. L., Zhuang, H., Zhan, S., Lee, S. S., Lin, A., & Matsunami, H. (2014). The missense of smell: functional variability in the human odorant receptor repertoire. *Nature Neuroscience, 17(1)*, 114-20.

12. Genetics of speech and language disorders

Vernes, Sonja C., Newbury, Dianne F., Abrahams, Brett S., Winchester, Laura, Nicod, Jérôme, Groszer, Matthias, . . . Fisher, Simon E. (2008). A Functional Genetic Link between Distinct

Developmental Language Disorders. *New England Journal of Medicine, 359(22)*, 2337-2345. doi: doi:10.1056/NEJMoa0802828

Enard, W., Khaitovich, P., Klose, J., Zollner, S., Heissig, F., Giavalisco, P., . . . & Paabo, S. (2002). Intra- and interspecific variation in primate gene expression patterns. *Science, 296(5566)*, 340-343. doi: 10.1126/science.1068996

13. Epigenetics I: mechanisms and examples

Joubert, B. R., Felix, J. F., Yousefi, P., Bakulski, K. M., . . ., & London, S. J. (2016). DNA Methylation in Newborns and Maternal Smoking in Pregnancy: Genome-wide Consortium Meta-analysis. *American Journal of Human Genetics, 98(4)*, 680-96.

Rudenko, A. & Tsai, L.-H. (2014). Epigenetic modifications in the nervous system and their impact upon cognitive impairments. *Neuropharmacology, 80*, 70-82.

14. Epigenetics II: transgenerational inheritance (the ghost of Lamarck)?

Dias, B. G., & Ressler, K. J. (2014). Parental olfactory experience influences behavior and neural structure in subsequent generations. *Nature Neuroscience, 17(1)*, 89-96. doi: 10.1038/nn.3594

Yehuda, R., Daskalakis, N. P., Bierer, L. M., Bader, H. N., Klengel, T., Holsboer, F., & Binder, E. B. (2016). Holocaust exposure induced intergenerational effects on FKBP5 methylation. *Biological psychiatry, 80*, 372-380.

15. Heritability and genetics of sexual orientation and sex differences; Sex selection for prospective births?

Ngun, Tuck C., Ghahramani, Negar, Sánchez, Francisco J., Bocklandt, Sven, & Vilain, Eric. (2011). The genetics of sex differences in brain and behavior. *Frontiers in Neuroendocrinology, 32(2)*, 227-246. doi: http://dx.doi.org/10.1016/j.yfrne.2010.10.001

Wang, B., Zhou, S., Hong, F., Wang, J., Liu, X., Cai, Y., ... & Ma, X. (2012). Association analysis between the tag SNP for sonic hedgehog rs9333613 polymorphism and male sexual orientation. *Journal of andrology*, *33(5)*, 951-954.

Copies of these references are on Owlspace under Location: PSYC 480 001 F16 Resources / Articles /